Gavin Groce
[redacted]

Gavin,

I hope you find these devices interesting. The Remote Measurements ADC-1 is an early example of a versatile and affordable interface that allows one to communicate with a number of different sensors and to control X-10 devices. I wrote a library of routines (in FORTRAN) to facilitate its programming and taught a course to expose students to how computers might be used in collecting experimental data and controlling devices.

Good luck with your exploration of these early efforts at bringing computer automation to a larger audience.

Larry

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The Use of Bright/Dim BSR commands with the ADC-1.

Several users have asked questions regarding how to utilize the ADC-1 to access the light level control available on BSR lamp modules. This note should help to clarify how the Bright and Dim commands function.

Though some older versions of the ADC-1 Owner's Manual may show otherwise, the BSR Dim command code is 201 and Bright is 203. To use either of these, simply select the module you wish to control, and repeatedly send a 201 or a 203. For example, if you refer to the program listing in section 3.7 Program Control of AC Line Carrier Modules, you could add a subroutine of the form:

```
300  UC=201
310  FOR I=1 TO 125
320  GOSUB 7000
330  NEXT
340  RETURN
```

You could access this routine by adding options to the input statement in line 90 and adding to the jump table (IF ACT=... THEN GOSUB...) at line 120. This routine will slowly, in about 40 seconds, dim a lamp plugged into a lamp module. Of course, if you want the lamp to be set at some intermediate intensity, then change the length of the loop in line 310. Also please note that if you want cycle a lamp through a dim/brighten cycle, you must resend the lamp's address code before starting the second loop.

Some of you have wondered why the dimming rate is so slow when the pushbutton handheld controllers are capable of changing a light level is about 5 seconds. We have designed a fix for the ADC-1 to allow rapid intensity changes but it requires both hardware and software changes.

BSR codes are transmitted on the AC power lines within 100 nanoseconds of the zero crossing of the AC voltage. Each code takes about 22 AC cycles to transmit. The ADC-1 normally waits a few extra cycles before changing the BSR busy/done bit which is checked in lines 7020-7040 of the sample program (section 3.7). This was done to prevent a succeeding command from overlaping with the one currently being sent even if the user did not check the busy/done flag before sending the next code. Overlapping codes prevent either command from being accepted by a remote module.

We were recently informed that if successive Dim or Brighten commands are sent within 3 AC cycles after the preceeding one has been transmitted, then a rapid change will occur. However the ADC-1 is wired to prevent such a rapid sequence of code transmissions. The following hardware modifications must be made to permit rapid

transmission of successive codes. The busy/done flag will still function, but the ADC-1 will no longer prevent code overlap. Prevention of overlap must be done in the software, either by checking the busy/done flag, or by waiting an appropriate length of time.

To modify the ADC-1 for rapid BSR code transmission:

1. Remove the printed circuit board from the enclosure and refer to the parts numbering diagram in the back of the Owner's Manual.

2. On the back of the circuit board, cut the two traces that connects pins 11 and 14 with pin 13 on chip U5.

3. Also, on the solder side of the circuit board, cut the trace which connects pin 2 of U5 with a plate-through at the end of chip U4.

4. Add a jumper between pins 11 and 12 of U5.

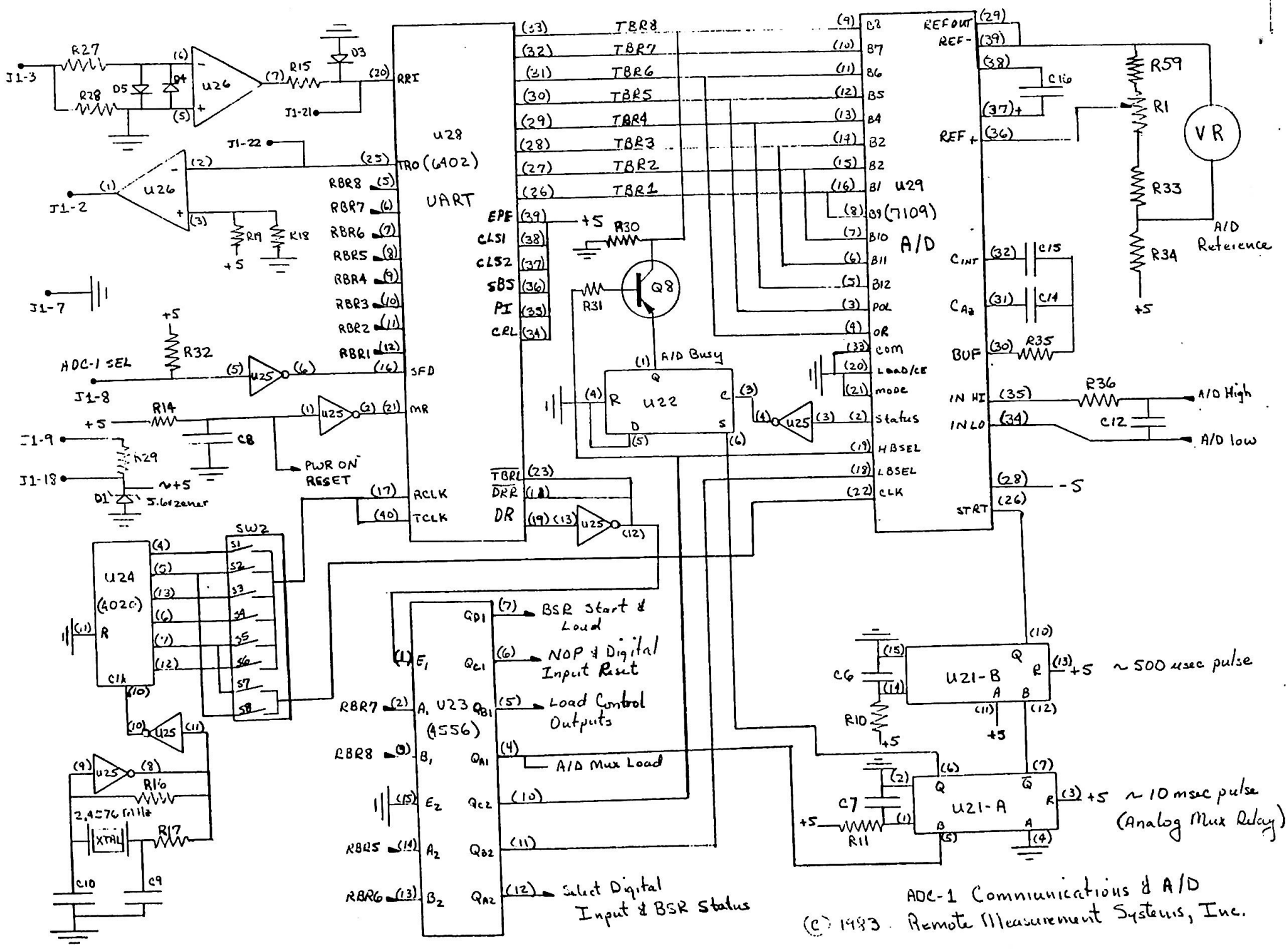
5. Add a jumper connecting pin 13 of U5 to pin 1 of U1.

6. Add a jumper to connect the plate-though isolated in step 3 and pin 10 of U5.

The software change required involves the replacement, for rapid bright and dim only, of the busy/done status check with a computer specific delay loop. We suggest that you create a special subroutine (GOSUB) for rapid bright/dim commands. An example would be (be sure UC is set to the device code):

```
7200 GOSUB 7000                    :REM send unit code
7210 U=201                         :REM set command for dim
7220 FOR I=1 TO 30                 :REM set # of dim's to send
7230 OUT PN,U                      :REM send dim
7240 FOR D=1 TO X :NEXT            :REM delay while code is sent
7250 NEXT I
7260 RETURN
```

The variable X should have been set previous in the program. Its value is dependent upon the speed of the computer and of the language you are using. There is a narrow range of values which will work. Too long a delay and you will get slow changes. Too short a delay and commands will overlap and nothing will be understood by the remote module. For a Z80A, 4MHz S-100 system a value for X of between 225 and 252 works. For a Northstar values of X between 245 and 265 work. Both systems were using interpretive BASIC from Microsoft. You will need to find the appropriate value for your system and language. Start with a value that permits the ADC-1 to function as if you were checking the BSR busy/done flag. The loop should create a delay of about 1/2 second. Try lower values until the lamp will not dim. The correct values is somewhere in between. If you find a value for a system not included here, please drop a card so that others will benefit from you experience. Thanks and Good Luck!



ADC-1 Communications & A/D

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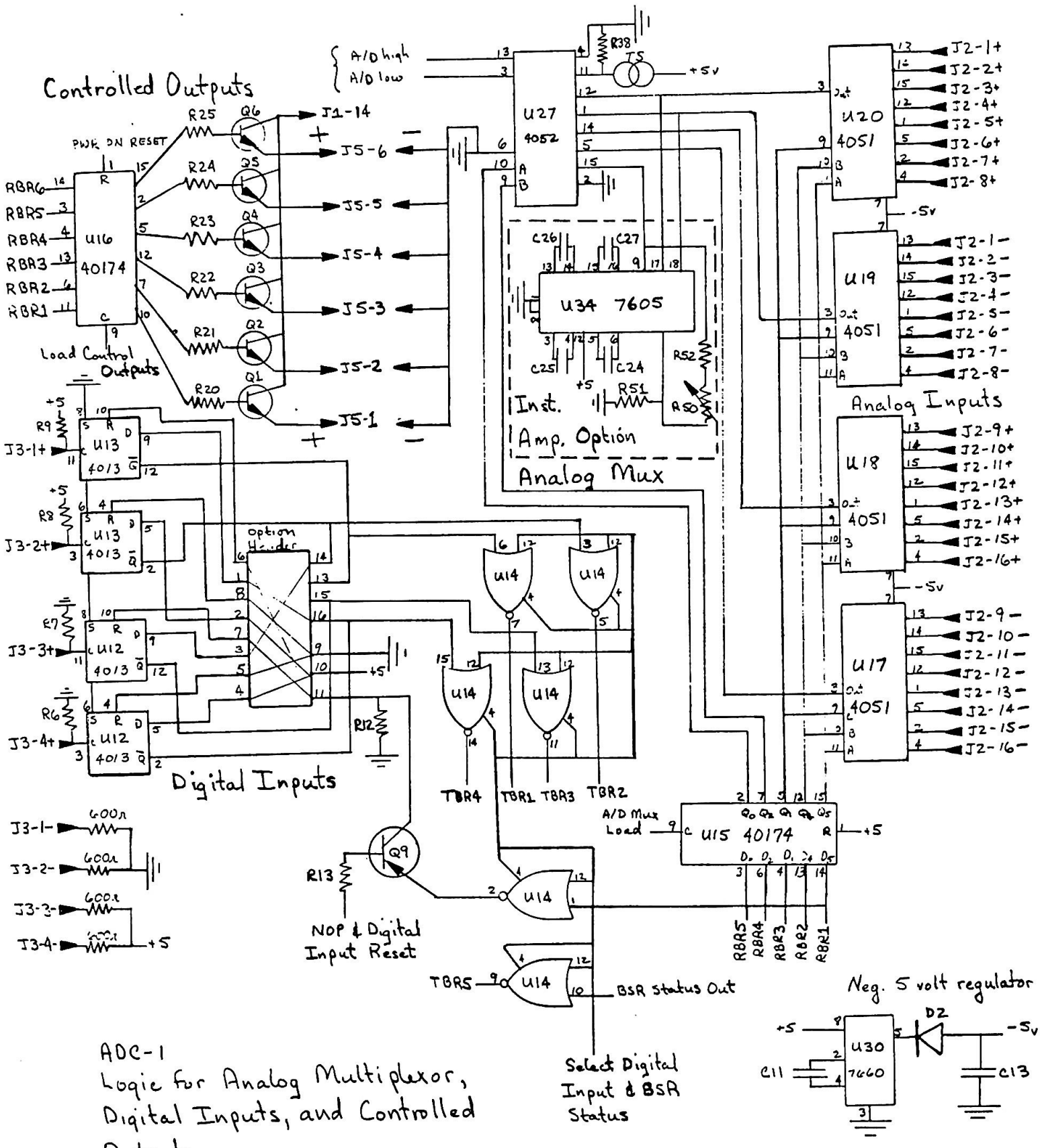

ADC-1
Logic for Analog Multiplexor, Digital Inputs, and Controlled Outputs.

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ADC-1 BSR Logic

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